AP Biology, Semester 1
Unit Quiz: Principles of Heredity
Instructor Version

Section I: Multiple-Choice Questions

Answer Sheet

1.	D
2.	D
3.	E
4.	A
5.	A
6.	E
7.	C
8.	C
9.	A
10.	C

11.	B
12.	D
13.	A
14.	E
15.	B
16.	E
17.	D
18.	B
19.	C
20.	A

©Copyright 2001 UCCP. All rights reserved.

Section II: Free-Response Questions

Time Limit: You have 30 minutes to complete this section. Both questions are weighted equally, so allow around 15 minutes for each question. You may move back and forth between questions until time is called.

Scoring: 20 points each, 40 points total

Directions: Answer each of the questions in essay form. Outline form is not acceptable. Labeled diagrams may be used to supplement your answer, but a diagram alone is insufficient. Read each question carefully before you begin to write your answer.

Note: The student's answers should be in prose form, not outline form; tables are presented here to assist the grader in identifying important elements of each answer.

1. Mitosis and meiosis are two types of cell division.

   A. What are the goals of mitosis and meiosis in diploid cells?

   ANSWER: The goal of mitosis is to generate a daughter cell that is genetically identical to the parent cell. The goal of meiosis is to reduce the chromosome number from *2n* to *1n*, and to generate genetically unique haploid cells.

   B. Describe the stages of the mitosis phase of the cell cycle, and discuss the events that occur in each stage in an animal cell.

   ANSWER:

Stage	**Events**
Prophase	Chromatin condenses into visible chromosomes Nucleolus disappears Centrosomes migrate and synthesize spindle microtubules Nuclear envelope disappears Spindle fibers attach to sister chromatids Nonkinetochore microtubules grow toward center of cell
Metaphase	Chromosomes line up along metaphase plate Sister chromatids separate (this also could be considered anaphase)
Anaphase	Sister chromatids move toward poles
Telophase	Chromosomes at poles Nuclear envelope forms Nucleoli reappear Spindle apparatus is disassembled
Cytokinesis	Contractile ring forms around cell (where metaphase plate used to be) Cleavage furrow forms Cell pinches in two

©Copyright 2001 UCCP. All rights reserved.

C. Describe the stages of meiosis and discuss the events that occur in each stage.

ANSWER:

Stage	Events
Prophase I	Synapsis Crossing over Chromatin condenses into visible chromosomes Nucleolus disappears Centrosomes migrate and synthesize spindle microtubules Nuclear envelope disappears Spindle fibers attach to sister chromatids Nonkinetochore microtubules grow toward center of cell
Metaphase I	Homologous chromosome pairs line up along metaphase plate Each chromosome is connected to only one pole
Anaphase I	Spindle fibers pull homologous chromosomes to opposite poles
Telophase I	Chromosomes at poles
Cytokinesis	Cleavage furrow forms
Interkinesis	Rest period sometimes occurs
Prophase II	Nucleolus disappears Centrosomes migrate and synthesize spindle microtubules Nuclear envelope disappears Spindle fibers attach to sister chromatids Nonkinetochore microtubules grow toward center of cell
Metaphase II	Single chromosomes line up along metaphase plate Each chromosome is attached to both poles
Anaphase II	Spindle fibers pull sister chromatids to opposite poles
Telophase II	Chromosomes at poles
Cytokinesis	Cleavage furrow forms Cell pinches in two

©Copyright 2001 UCCP. All rights reserved.

2. Explain how each of the following produces an offspring phenotype ratio that differs from that expected by Mendel's laws of inheritance:

   A. Codominance in a monohybrid cross between two heterozygous individuals
   B. Recessive lethal alleles in a monohybrid cross between two heterozygous individuals

   ANSWER:

	Mendel's expected offspring phenotype ratio	**Actual offspring phenotype ratio**	**Explanation**
Codominance	3 dominant: 1 recessive	1 dominant phenotype A: 2 codominant phenotype AB: 1 dominant phenotype B	In Mendel's experiments, heterozygotes display the dominant phenotype. In codominance, heterozygotes display a novel phenotype that is the additive phenotype of both codominant alleles.
Recessive lethal alleles	3 dominant:1 recessive	100% dominant	If homozygous recessive offspring die, all remaining offspring will have the dominant phenotype.

©Copyright 2001 UCCP. All rights reserved.